Successful Methods

Construction - Road Making - Engineering - Industrial - Mining

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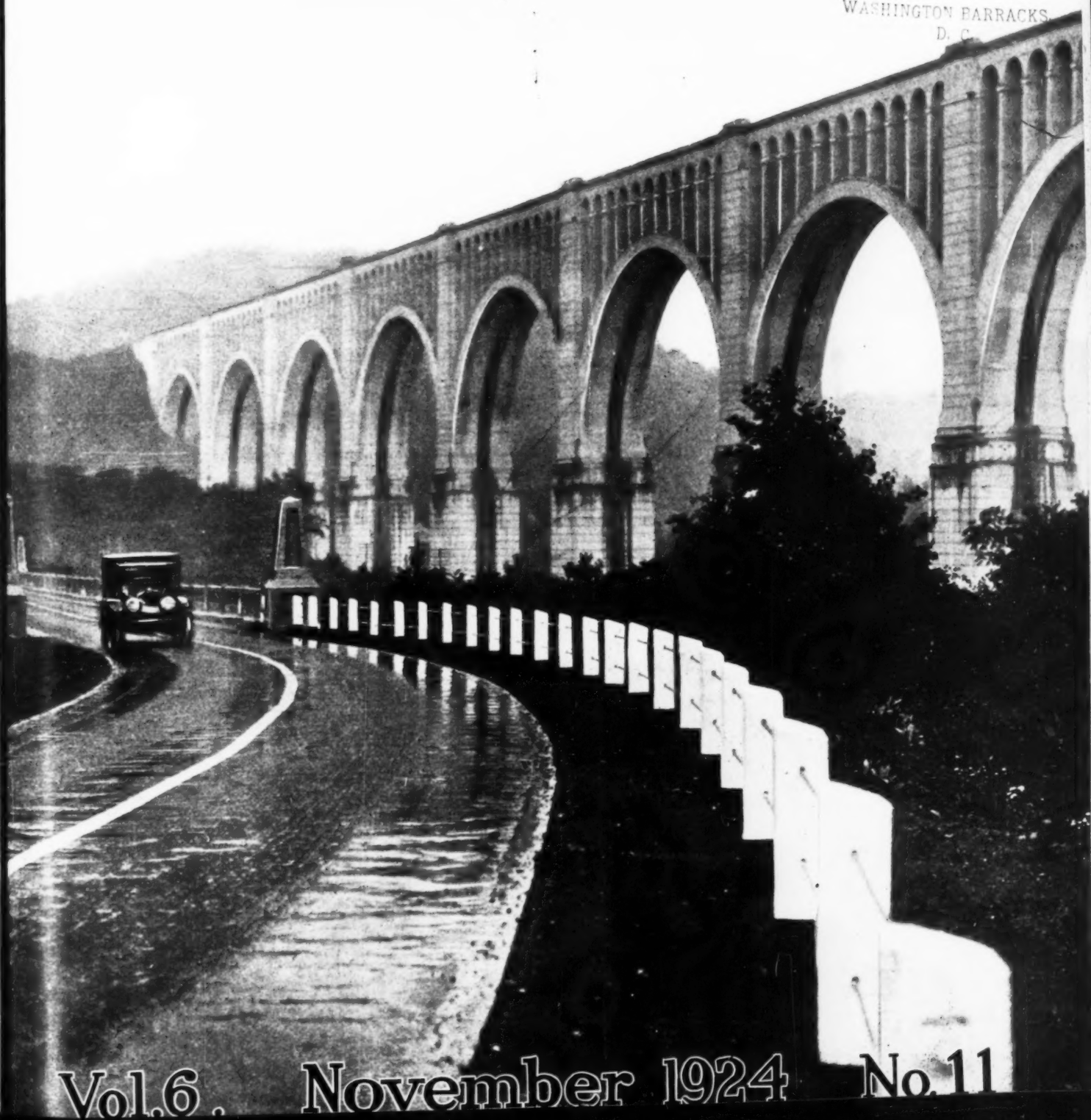

Vol. 6. November 1924 No. 11

Austin Leaning Wheel Graders

The time-tested features that have made Austin Graders the choice of experienced operators for over 40 years will all be found on the Leaning Wheel models. In addition, they are distinguished from all other Leaning Wheel graders by several improvements of great practical value. The Telescopic Rear Axle, Timken Tapered Roller Bearings and Alemite High Pressure Lubricating System are exclusive features whose value will be admitted by all impartial authorities.

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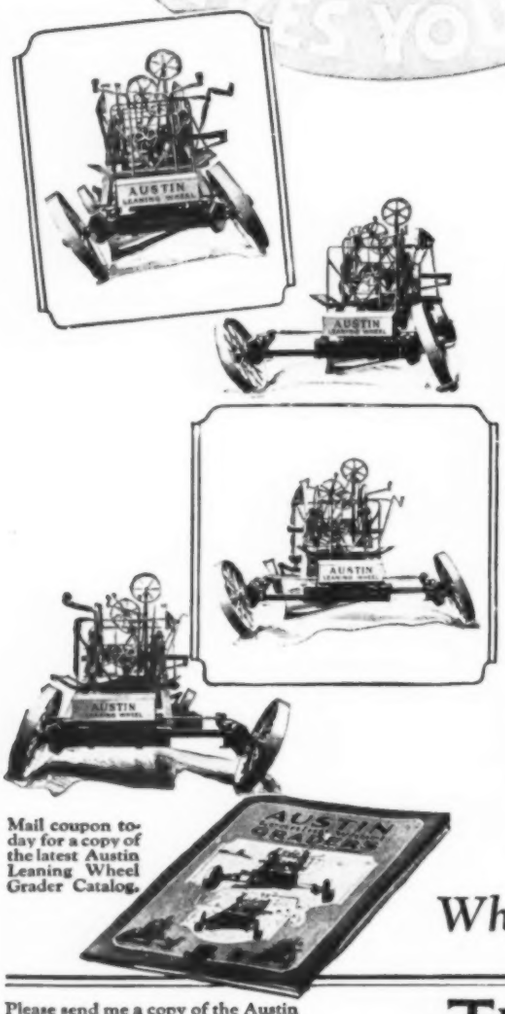
The Telescopic Rear Axle, Timken Bearings and Alemite Lubricating System are but three of the things that contribute to Austin superiority.



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CHICAGO

Successful Methods

A Magazine of Construction Service

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Keeping Their Teeth Sharp

A RECENT casual inspection of the teeth on six clamshell buckets and seven power-shovel dippers, all digging hard material, showed that only one set of teeth in the lot were really sharp enough to get good results. Some of the teeth were so dull as to be a handicap instead of a help. Further investigation of four of the thirteen cases brought out the fact that neither the man in charge nor the operator really sensed the need of keeping the digging teeth sharp. And, still, these same men would kick a plenty if they had to shave with a dull razor.

The failure to see the value of the proper condition of bucket and dipper teeth is not exceptional. In fact, those who are required to visit numerous construction jobs find a surprising amount of lack of grasp of the value of keeping up the details of every piece of equipment on the job.

Few foremen and superintendents can be expected to have sufficient mechanical experience to enable them to qualify as experts on all the complicated equipment used these days. They should, however, possess the plain horse sense which causes a man to watch for the leaks that have so much to do with the success or failure of every construction job.

At least a part of the responsibility for keeping a piece of equipment in proper working shape is, of course, up to the operator. If he is a good operator, he just naturally will do that as a part of his job. But good operators are scarce. Even the best of them will not take the pride they should in their machines unless the boss is on his job. What a different attitude the half-way good machine runner takes when he knows that the boss is watching the condition of the details of his unit! So in the long run it is up to the boss to keep his eyes and ears open for the things that can cut the capacity of a machine without an inexperienced man even being able to spot them.

Due to Break All Records

USING the hackneyed expression of the circus press agent, the 1925 convention and road show of the American Road Builders' Association at Chicago in January "will be the biggest and best ever held." In this case there are plenty of facts to back up these superlatives.

The present outlook is for a gathering of road builders from all parts of the country that will exceed in numbers all previous records. A large percentage of contractors, and of State and county officials in charge of field work as well, is anticipated.

The number of applicants for space in the road show was greater two weeks ahead of the date for space allotments this year than last year's record final total. These included thirty-eight concerns who have not previously displayed their products. Experience in the past also has been that many space applications come in at the last moment. The show will exceed in size and in the number and character of the exhibits any annual industrial machinery exposition ever held.

A College Course in Contracting

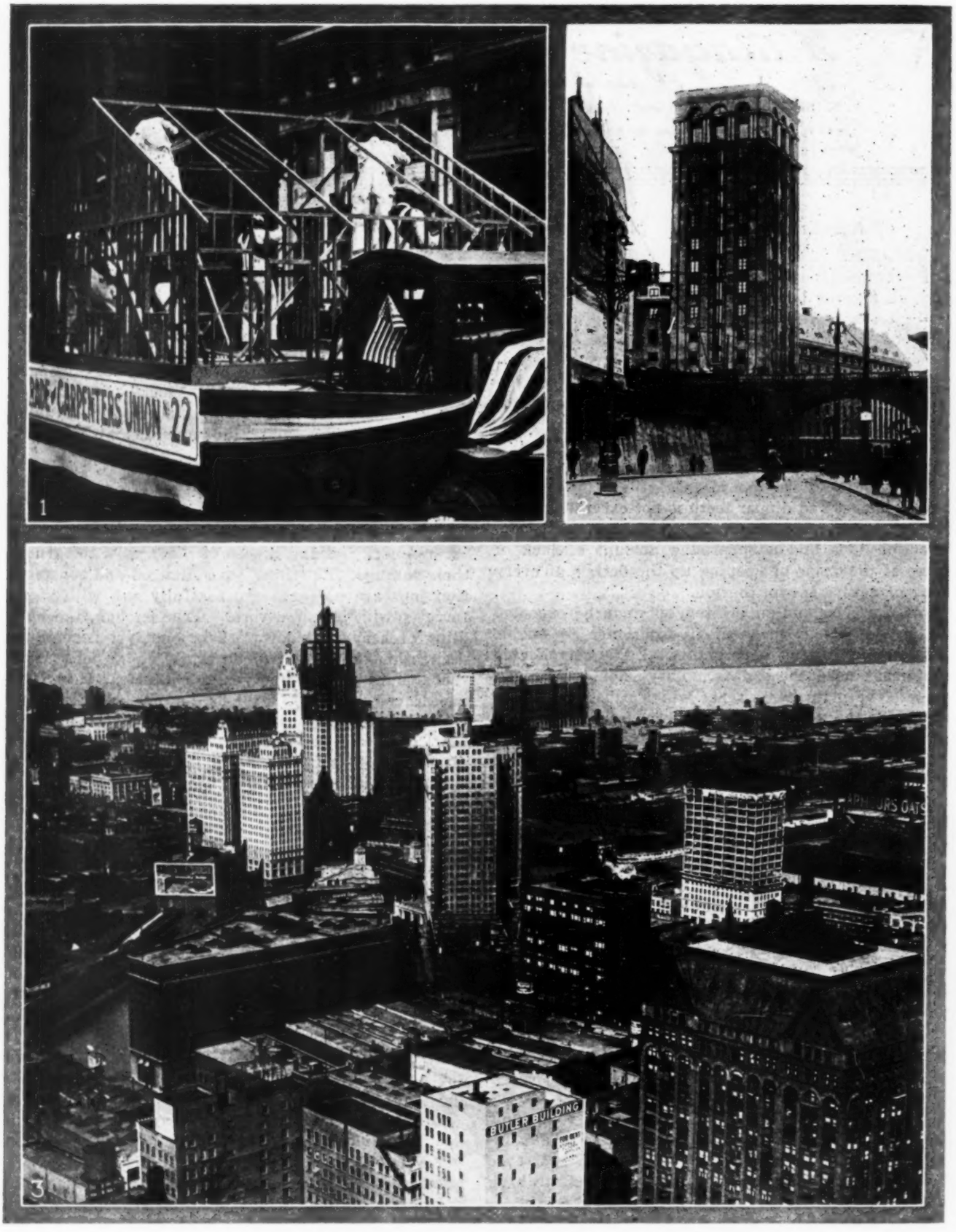
THIS subject will probably cause some of the old red-neck walking bosses of other days to turn in their shrouds. But times have changed and construction jobs are no longer successfully run with sheer force of will, arm and voice. True enough, the handling of heavy outdoor work has not yet become an occupation that is entirely a white collar job. With the amount of machinery and equipment that it is necessary to use on most jobs, however, and with all the complications that enter into construction work now, men who succeed in it must have much more all-around ability and experience than in the past.

One by one other lines of highly specialized occupations have found that it pays to train young men for their lines by means of college courses. For example, we now have overcrowded schools teaching banking, commerce, journalism and similar highly specialized occupations. Nor is it more than the span of a single life since the first recognized course in engineering was offered in this country.

The point may be raised that the construction business is different. Certainly it is. What is more, it is peculiarly specialized, or should be, to be permanently successful. But what of that? Twenty years ago newspaper men were sure that the only way to train a journalist was on the firing line. Now even the hard-boiled see the value of the specialized college courses in journalism.

Some of these days some far-seeing university president is going to grasp the fact that the construction industry, running into billions of dollars of expenditures annually, has no chance to draft recruits who have been trained in the peculiar problems of this industry. If he works out a course along the right lines he will bestow a legacy on the construction industry whose value can scarcely be overestimated.

Plenty of Work

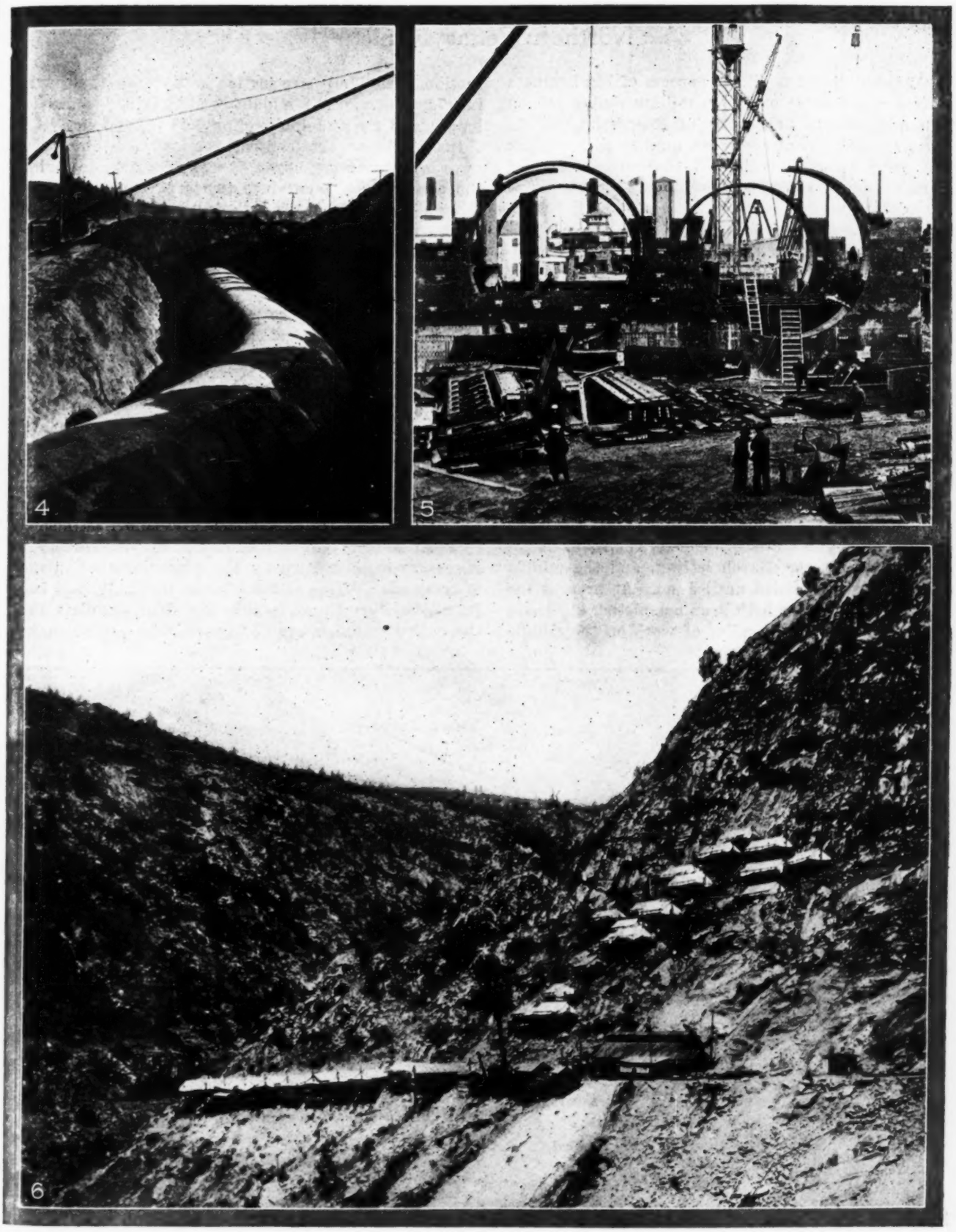


1—A house that was put up during a parade. The San Francisco carpenters put over this stunt on Labor Day. © P & A Photos.

2—This is Europe's idea of a tall building. It is said to be the highest office structure on that continent. © P & A Photos.

3—A building boom has hit Chicago. This photograph shows six large structures either under construction or which have been finished recently. The tallest building of the lot, beyond the Wrigley Building, is the Tribune Tower. © P & A Photos.

For the Builders



4—A big pipe which will carry away sewage from Los Angeles. © *P & A Photos.*
5—Caissons for the tunnel which is being built across New York Harbor from Staten Island to Brooklyn. © *P & A Photos.*
6—This construction camp in the California mountains is maintained by a power company. After vainly looking for a level spot, it was decided to let the houses perch on the steep hillside. © *P & A Photos.*

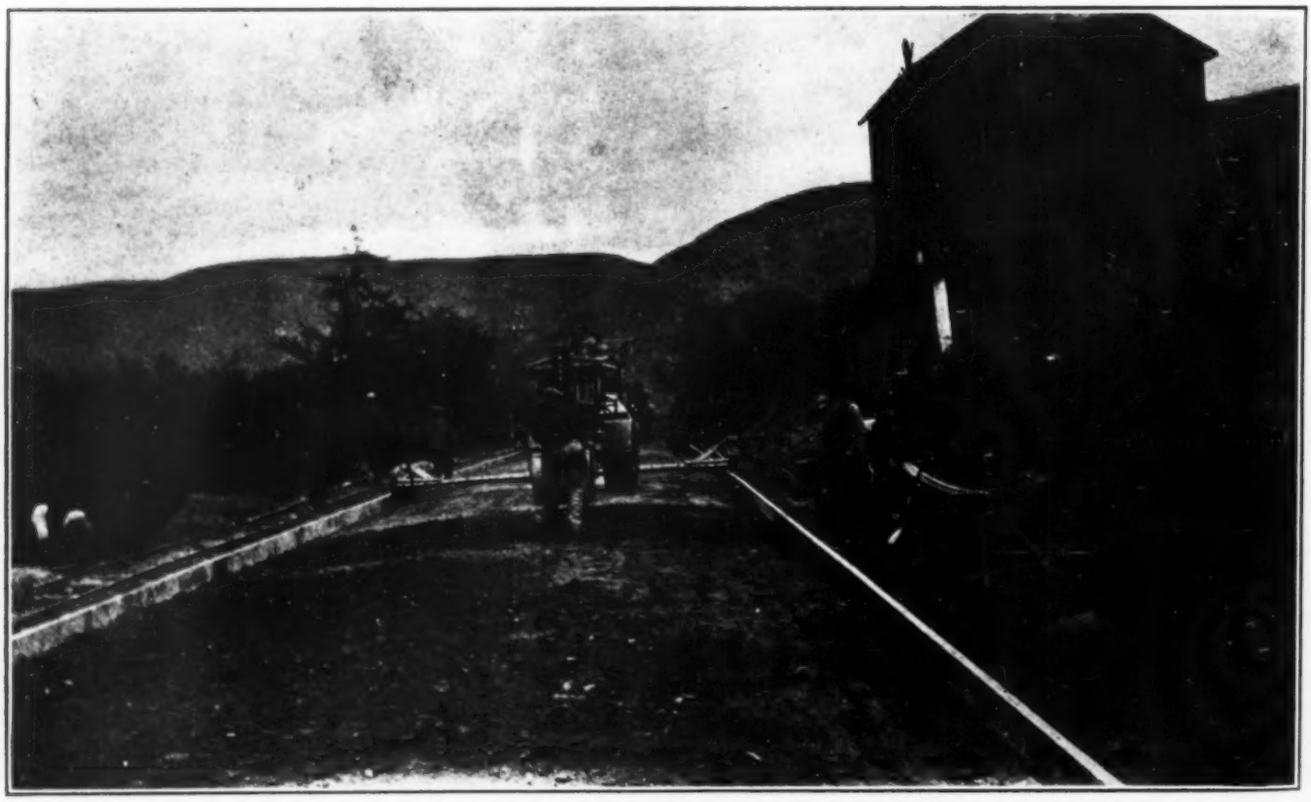
A MILLION DOLLAR ROAD JOB

Twenty Consecutive Miles of Concrete Highway Let to One Contractor in Northern Pennsylvania

ROAD building has all the aspects of big business when a contractor has a million dollar job on his hands. David Schoentag of Saugerties, N. Y., is proving that a contractor can qualify as a captain of industry by constructing 20 continuous miles of concrete road in northern Pennsylvania for the State Highway Department at a total cost of $1,033,000. This doesn't mean that the Pennsylvania State Highway Department has adopted a policy of letting million dollar contracts, because as a matter of fact this particular stretch of road was let in three separate contracts, two of them in March and one in June. Mr. Schoentag was the successful bidder on all three, and as a result has been able to concentrate in one place his road building plant which formerly has been operating in separate units. For example, in 1923 Mr. Schoentag handled jobs in North Carolina, Delaware and Pennsylvania.

The 20-mile section which Mr. Schoentag is building extends from Wellsboro to Galeton in Tioga and Porter counties, Pennsylvania, which border on the New York State line. The first two contracts let were for the Galeton and Wellsboro ends of the road. These were awarded at the March letting, and the middle section was not awarded until June. At present the two end sections have both been completed, but there still remains about four miles of work on the middle section. The Wellsboro section is the longest, measuring 7.36 miles. The middle section is 6.66 miles in length and the Galeton section 5.58 miles long.

Inasmuch as the central section had not been awarded when work began, it was necessary to divide the construction plant into two separate units. Although the contract was signed in March, the late spring made it impossible to begin actual construction until more than a month later. Mr. Schoentag is a believer in the use of industrial railway on road jobs where the grades are not too great, and as the section at the Wellsboro end was well adapted to an industrial layout, he decided to go ahead on that basis. At the Galeton end there were several grades which made the use of industrial track inadvisable, so he decided to use motor trucks to supply material to the mixer. He refuses to commit himself as to the comparative merits of the two methods, saying that each has its own distinct sphere and that when a grade in excess of 3 or 4 per cent is encountered trucks should be used rather than industrial haulage. On the middle section, on which work is being pushed in order to complete as much as possible before it is necessary to shut down for the winter, truck haulage is being used. This section climbs to a height of 200 ft. above Pine Creek, which the road parallels for the entire distance, and, of course, the grades make



PREPARING THE SUBGRADE WITH A SMALL ROLLER

THE FIRST SNOW FLURRY OF THE WINTER CAME ALONG JUST AS THIS PHOTOGRAPH WAS TAKEN OF THE MIXER AT THE WELLSBORO END SERVED BY THE INDUSTRIAL RAILWAY

industrial haulage out of the question in this section.

Near one end of the Galeton section a material plant was built when work began. One mixer was put to work as soon as the grading had been sufficiently completed for the laying of concrete to begin, and this mixer went right through to the end of the section. At the same time another mixer started at the Wellsboro end, the longest section of the three, and just finished its job in the first snow flurry of the season in the latter part of last month. At present two mixers are at work on the middle section, one on a fairly level part of the road and the other at about

ON THE CENTER SECTION. THIS MIXER IS SERVED BY MOTOR TRUCKS

MATERIAL BIN DEVISED BY MR. SCHOENTAG. THE TRUCKS LOAD UNDER THE PLATFORM

the highest point which the new highway reaches. Both of these mixers now working are, of course, being supplied with material by trucks.

Two material yards are still being utilized for the middle section. The material yard for the Galeton section was close to the lower end, so it is still available for the mixture at that end of the middle section. The other material yard is at a point about midway of the middle section and can be utilized until the job is finished. The biggest material yard of the three, at which the material for the Wellsboro section was kept, consisted of stock piles of sand, gravel and stone, unloaded by a crane and penetrated by tunnels. The industrial cars were run through these tunnels, halting long enough to receive the aggregates. The cement house is extremely well equipped, with a tunnel under the floor through which the industrial railway passes, so that the batch boxes can be loaded with cement from above just as is done with the other aggregates. At the two material yards where trucks are loaded, special bins, designed by Mr. Schoentag, are used. These bins hold approximately two carloads of stone and one carload of sand. The trucks pass under the discharge spouts of the bins and can be loaded in less time than it takes to tell about it.

As this 20-mile strip of road, which will become part of Roosevelt Highway, follows the course of Pine Creek, crossing the creek about midway, an unusual number of concrete structures had to be built to carry the various small streams under the highway. Several large fills had to be built, and in one case concrete pipe 150 ft. in length has been constructed to carry a small stream under one of the fills. The excavation for the Galeton end consisted of about 45,000 yd.; for the Wellsboro end about 40,000 yd., and for the more difficult section about 75,000 yd. The contract for the bridge which will carry the highway across Pine Creek and the railway has not been let.

Two small sections of the road which will form the approaches to the bridge on each side also have not been included in the present contracts. They will be let when it is decided to begin work on the bridge.

When the contracts were let it was planned to build the center section one half the width of the pavement at a time, keeping the other half open for traffic. Mr. Schoentag, however, obtained permission to pave the whole width at the same time to speed up the work, and in order to take care of traffic had to build his own detours. Altogether he has constructed about four miles of detours which wander over the hillsides and through the woods in thoroughly picturesque fashion. He estimates that these four miles of detours cost him only about $3,000, including a few small sums which he had to pay for leases. Most of the detours were constructed with a scraper, but on one section he had to do some real excavating with a gasoline shovel. These home-made detours are one of the features of the job, and as they have speeded up the work, some of their faults have been generously overlooked by the motorists in the vicinity.

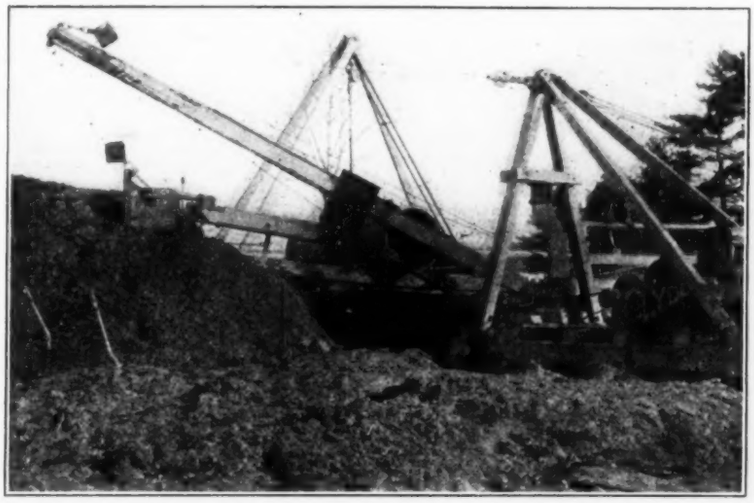
Three superintendents have had charge of the work. M. C. McDermott has taken care of the Wellsboro end, John Burns has built the Galeton section, and I. V. A. Huie the middle section. The engineer for the State is T. E. Major. W. E. Bailey is the district engineer in this territory.

DITCH DIGGING IN MASSACHUSETTS

Dredge Operated by Small Gasoline Hoist Cuts Through Wooded Land

ALTHOUGH it is one of the original thirteen States, Massachusetts is still engaged in improving itself for the benefit of its inhabitants. The State is draining swamps in various sections in order to increase the amount of land fit for agricultural purposes.

Antone & Ransome of Greenfield are engaged in one of these State drainage operations. The job consists in digging a ditch about three miles in length, 12 ft. wide, and with an average depth of about 5 ft. It runs through a heavily wooded section consisting of red oak, soft maple, scrub birch and other timber which is to be found in swamps in the northeastern part of the country.



A GASOLINE HOIST OPERATED THE DREDGE

The soil is everything from sand and gravel to long stretches of heavy blue clay and rock. It was necessary to use powder in getting out the rock, some of the pieces weighing as much as 3 tons.

In order to dig this ditch the contractors designed a small dredge operated by a 15-hp. gasoline double drum hoist. This small machine handled the job from start to finish in spite of the various kinds of soil in which it had to operate and the numerous obstructions which had to be removed. For example, the trees were almost all removed by the simple process of digging around the roots until they were loosened and then hauling them aside.

The upper photograph on this page shows the dredge at work. The lower photograph shows a typical section of the 3-mile ditch and gives a good idea of the character of the difficulties which were encountered.

A TYPICAL SECTION OF THE THREE MILE DRAINAGE DITCH

The job required the removal of a total of approximately 28,000 cu. yd. of material and the digging plant went through from one end of the ditch to the other without any time off for repairs.

The contractors report that they never had the head off the motor which operated the hoist. They were wise enough, however, to insist that the engineer keep the motor and hoist clean, well oiled and greased. This attention to the upkeep of the plant was largely responsible for the satisfactory fashion in which it performed.

The use of gasoline equipment for a job like this made it easy to keep a supply of fuel on hand as gasoline could be brought to the place where the excavator was working without the difficulty which would have attended the bringing in of a more bulky form of fuel.

This entire plant is an excellent example of what a contractor can do when he puts his mind to it. The various units were bought separately by the contractors and assembled into a compact piece of excavating equipment according to their own ideas. The fact that it did the job speedily and well is a good indication that the planning was well done.

Work of this character often requires equipment specially designed for the particular job, but there are so many adaptable machines that it is easy for a wide-awake contractor to assemble a plant.

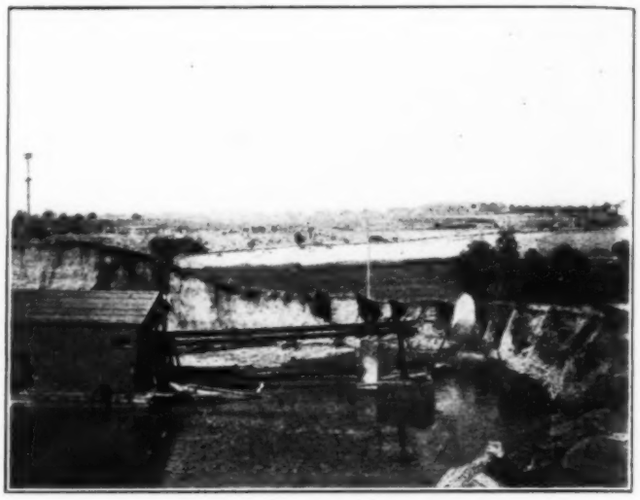
ELECTRICAL EQUIPMENT CUTS COST OF PRODUCTION

Small Force of Men Required in Big Sand and Gravel Plant at Oxford, Michigan

F. L. WARD

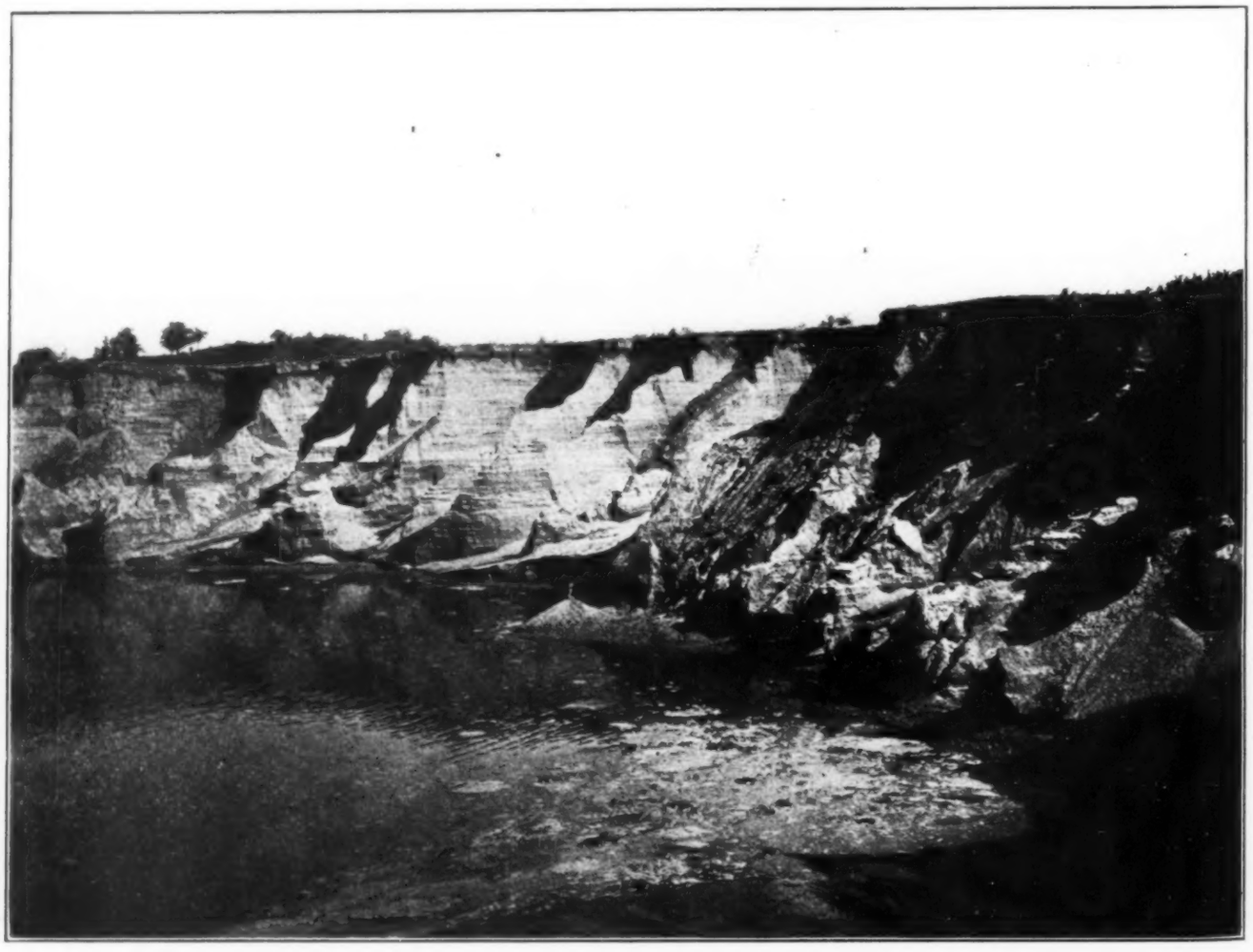
A SAND and gravel plant that is producing 36,000 cars of material a year with a working force of only 50 men must be a splendid example of the efficiency of machinery. The Ward Sand & Gravel Company operates such a plant at Oxford, Mich., and has equipped it with the latest machinery for such work. All of the equipment is electrically operated, which accounts in a large measure for the small number of men necessary.

The Ward family has been prominent in southeastern Michigan for a great many years. This particular sand and gravel plant is the property of F. L. Ward, who bought it around 1900 for $100 an acre. The company owns 300 acres and the character of the material taken out can be judged by the photograph at the bottom of this page. The deposit is entirely free from clay and lies in strata

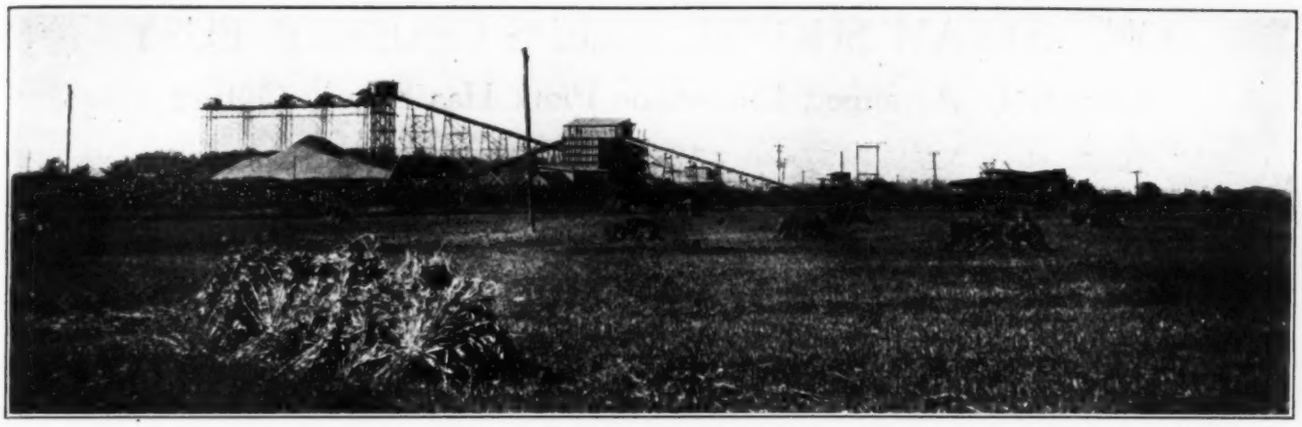


BOAT DREDGE AT WORK EXCAVATING SAND

of about 2 ft. of small pebbles, then a few inches of sand, then more pebbles, then another layer of sand. The surface of the land which has not yet been



THIS PICTURE SHOWS THE CHARACTER OF THE MATERIAL PRODUCED



LOADING BINS AND STOCKPILE WITH WHEAT FIELD IN FOREGROUND

stripped to obtain sand and gravel is utilized for the raising of corn, buckwheat and other crops. The company is fortunate in that the deposit is close to the Michigan Central and Grand Trunk railroads and also to an electric line which makes it possible to get out shipments with little loss of time. Some of the railroad companies buy sand at the Ward plant and back in a string of cars, which are filled without even disconnecting the engine. Gravel and sand also are supplied to contractors. The company owns 2½ miles of railroad siding and in addition the Grand Trunk Railroad is now putting in a siding of its own.

The small photograph on page 8 shows a portion of the boat dredge and pontoons used in excavating the material. The small jet of water breaks down the banks of the deposit and the material is then pumped out. A long section of the pipe line may be seen in the background of this photograph.

In addition to operating this plant Mr. Ward is planning to open up other gravel plants in Michigan and also expects to have a plant in California.

Associated with Mr. Ward in the production of sand and gravel are E. M. Hammond, who is treasurer of the company, and Charles E. Pelton.

THIS PHOTOGRAPH SHOWS THE MAGNITUDE OF THE OPERATIONS

ONE STEAM SHOVEL KEEPS CRUSHER BUSY

Compactly Arranged Limestone Plant Has Steady Output

A LIMESTONE plant which produces a high quality of limestone, the percentage of calcium carbonate being about 97 per cent, is being operated at Palmyra, Pa., by the Annville Stone Company. This plant has an average production of about 880 tons per day.

A steam shovel equipped with a dipper of 1 cu. yd. capacity has been handling this work and has produced as much as 1068 tons in one day. The quarry face is approximately 125 ft. high and the pit is 200 ft. wide, as shown in the photograph.

STEAM SHOVEL AT WORK

The crusher has been installed upon the quarry floor, and the material is conveyed from the shovel, which is about 500 ft. distant, in two 6-ton side dump cars. A double loading track is used, and as the shovel can reach either track, one car or the other is moving all the time. The car on one track is loaded while the other car is being hauled to the crusher by a gasoline locomotive and unloaded.

After the material has passed through the crusher, it is elevated by a conveyor to the screening and loading plant outside the quarry and about 100 ft. above. This conveyor passes through a tunnel driven upward through the wall of the quarry at a rather sharp angle. It is so located that the crusher is in the center of the quarry floor. In spite of the steepness of the pitch the stone is carried with practically no spill.

This arrangement of a plant is unusual, but it has proved its worth. The material is excavated, crushed, screened, and loaded with a minimum of labor.

GENERAL VIEW OF QUARRY WITH CRUSHER ON QUARRY FLOOR

Two Great Causeways

The new structure which New York City has built to shorten the route to Rockaway. © *International.*

The Gandy Bridge between St. Petersburg and Tampa, Florida, which will be opened this month. It is six miles long and is named after George S. Gandy, the builder. © *P & A Photos.*

SCIENCE CONTRIBUTES TO BETTER CONCRETE

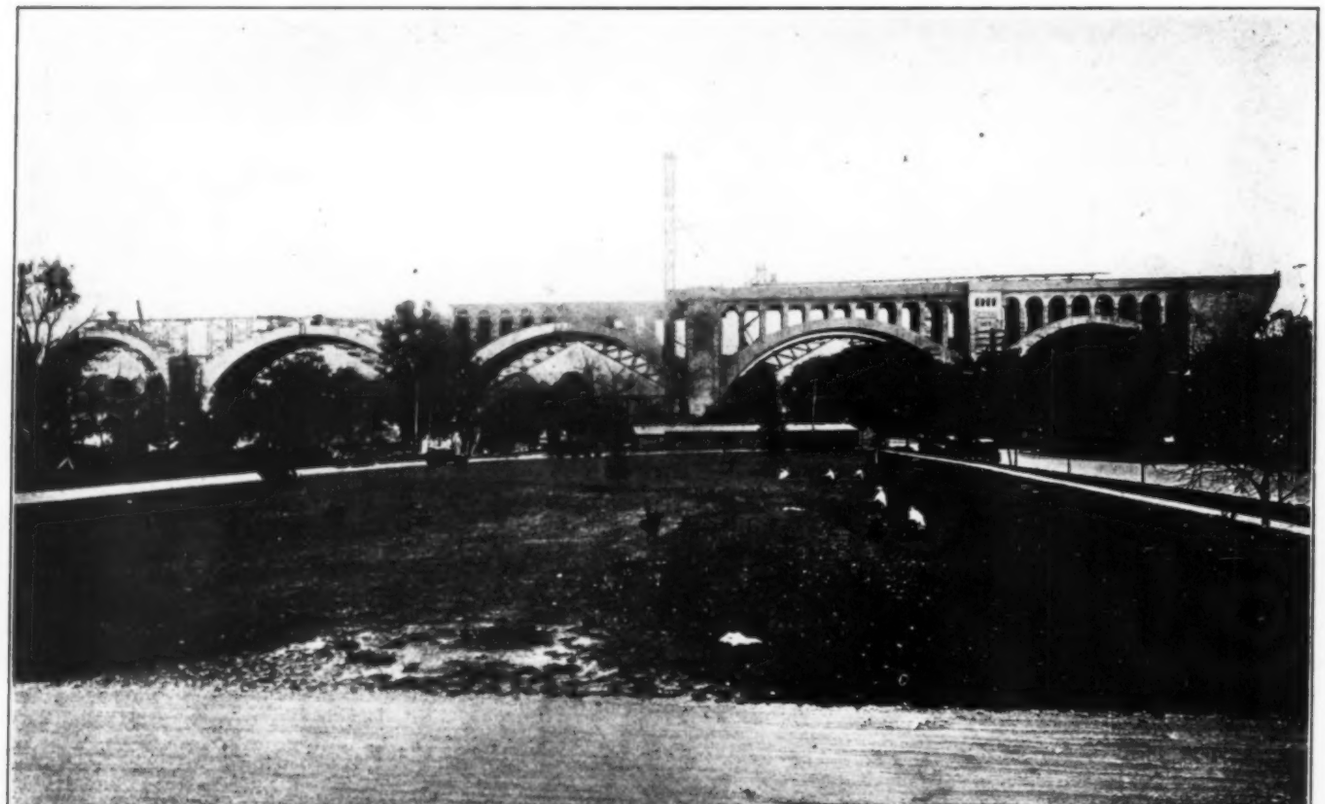
Laboratory Investigations Applied to Field Work Save Money for the Owner and Contractor

DOWN near Sidney, Ohio, the Big Four Railroad has a huge concrete bridge over the Miami River. It contains 28,000 cu. yd. of concrete and every yard is placed under scientific methods. The foundation for Chicago's newest skyscraper, the Tribune Tower, was laid recently. Laboratory methods controlled the designing and mixing of every bit of concrete in that substructure. In Canada's largest hydro-electric development, the Queenstown-Chippewa Canal, 410,000 cu. yd. were placed. These three structures, along with others here and there, predict a new era in the methods of concrete construction—the application of science to the mixing, placing and curing.

Certainly the rule-of-thumb method still persists, although the mixing box days fortunately have slipped into history. Modern machinery has revolutionized the industry. Yet, there are millions of cubic yards of concrete annually placed under contracts that specify a particular mix and entirely neglect certain factors that have the greatest influence on the strength of the finished product. Scientific principles which have been so carefully applied to the design of the structure itself have been neglected in the proportioning, mixing and curing of the concrete.

For four or five years a few leaders have been trying to impress the building public with the practicability of applying the results of laboratory investigation to actual field work. These pioneers have had an arduous task to introduce new methods into an art so firmly established as that of making concrete. Predesigning a concrete mixture has been a much discussed topic on the contractor's forum. Selection of the aggregates, time of mixing, limitation of the mixing water, protection while curing—all these topics have come in for their share of consideration. But it is only recently that any serious attempt has been made to apply these principles to large-scale production. And lately a structure was proposed that will mark a most radical change from present day methods. The specifications for a large reservoir near Chicago make no mention of mixture or of aggregate —they state that the concrete must show a certain strength under certain conditions and that is all.

The common conception of designing a concrete mixture was an intricate highly scientific method. Back in the laboratory where thousands of tests have been made to establish the control of the variables, science was deeply involved. But this work would have gone for naught had it not resulted in simple, easily applied methods for actual field use. And their



BIG FOUR BRIDGE NEAR SIDNEY, OHIO

application has been established. Several projects recently completed and the indications of several more in the process of construction show that the method of designing a concrete mixture, as worked out in the laboratory, is easily possible under field conditions. What's more—it is practical financially. In

MAKING SLUMP TEST

the words of the engineer of the Big Four bridge, "Quite dry concrete of aggregates properly proportioned can be worked without difficulty and handled by the usual methods and with considerable saving in cement over that necessary in the wetter mixtures of equal strength."

When a railroad such as the Big Four undertakes the construction of a structure as large as the Miami bridge and is as well satisfied with the methods adopted as the engineers of the road appear to be, it is a hopeful sign that the generation-old method of arbitrary proportions will have to succumb to the newer up-to-date methods. It is not at all impossible that a better understanding of scientific mixing will tend to reduce the amount of material required for a certain specified strength from that in present use and thus eventually have its effect on the cost of construction.

Certainly these principles have advanced beyond the laboratory stage. Experience has shown that the ordinary 1:2:4 proportion is far from satisfactory under a great many conditions. For a long time the importance of clean aggregates, proper grading for given strengths and proper constituents have been understood. Their theories have been disputed and argued, found to be correct and possible of practical application. Yet, in many places where concrete construction is in progress, it is not infrequent that materials and methods will be found in use that have been known for years to be the cause of trouble. There is no excuse for this.

The two factors that must be watched in the field are the proper proportioning of the ingredients which make concrete (with especial care to see that the quantity of water is correct) and the proper curing of the concrete after it is in place.

Within certain limits the amount of mixing water is as important in securing good concrete as the quantity of cement. The strength of the finished product depends on the ratio by volume of the water to the cement. This is known as the water-cement ratio. As long as the mixture is plastic or workable, the smaller the water-cement ratio, the stronger the concrete. Obviously, for different kinds of concrete, different amounts of water are required. For roads, less is needed than for slabs, beams or girders. But in any case, by keeping the water-cement ratio constant, the same strength may be expected. In general construction work maximum strength can seldom be secured, because the mixture would be too stiff to be workable, but 70 to 90 per cent of the maximum strength can readily be obtained. The designing engineer, figuring on a compressive strength of 650 lb. per sq. in., expects to get a factor of safety of three, but may not with the sloppy mixtures often used. By cutting down the

RAMMING CONCRETE INTO TEST MOLDS

water to the proper ratio a factor of safety of five or six can be secured, or the present allowable unit stress raised. No doubt, from the contractor's point of view, the excessive water mixtures so frequently used in building construction are desirable, but the designer or owner has lost in some cases as high as 50 to 60 per cent of the possible strength. Either the structure is weakened from the original design or the designer, aware of usual practices, has provided for an unnec-

cessary amount of material. In either case trouble results. As a simple method of determining the constituency of concrete in the field, the slump test has been devised. It consists of filling a metal form, shaped like the frustrum of a cone, lifting off the form and measuring the settlement or slump of the concrete in inches. Even with comparatively wet mixtures the amount of the slump furnishes a reasonably accurate method of checking the actual consistency and keeping it uniform.

CURING CONCRETE BY PONDING IN ALABAMA

In the specifications of fifteen State highway departments slump tests are now required on all the concrete used in road work. Several recent hydraulic, railway and building contracts specify checks of the consistency by this method. The concrete placed in the Big Four bridge was checked that way. Inspectors took regular checks on the concrete for the foundation of the Tribune Tower.

Little favor was shown the slump method by contractors at first. There was a general belief that it meant an especially dry mixture and consequently involved more expense in placing. However, actual construction experience has shown that even with the tower and chute method dryer concrete than has commonly been used can be satisfactorily handled if the aggregates are properly proportioned and thoroughly mixed, and with a considerable saving in cement over that necessary in the wetter mixtures of equal strength. In any event, the slump test is valuable in keeping the consistency of the concrete and its strength uniform.

If the best concrete is desired, as much attention must be given to providing water, or moisture, after the mixture is in the form as in limiting the amount of water in the mixing. The hardening of concrete is not a drying-out process but a chemical reaction between the mixing water and the cement. This reaction is slow and if external moisture is not present some of the mixing water essential to the process will be lost by absorption or evaporation even after the concrete has begun to harden. Under such conditions concrete attains only part of its potential strength. Investigations have established the fact that concrete properly protected for the first ten days will show 65 per cent more resistance to wear than improperly cured concrete, and if protection is provided for three weeks the resistance will be doubled.

On the Big Four bridge the arch rings were sprinkled several times daily for two weeks and as the deck was completed the drain holes were plugged and the surface flooded. Practically all highway departments now require concrete roads to be ponded or covered with moist earth or straw for a specified period after placing. Concrete floors under cover require moisture just as roads and pavements in the open.

Modern machinery used in handling the raw materials, in mixing, and in placing the concrete has done much to reduce the cost of construction—it only remains for the contractor to capitalize on these improvements in improving the quality of the product by proper attention to the proportioning, mixing and curing.

Many contractors in all sections of the country are awake to the possibility of using concrete which is scientifically tested, and the number of such contractors is continually increasing. They find that by substituting accurate analysis for the old "rule of thumb" methods they effect considerable savings and are enabled to turn out a job in which they can take pride for many years to come. These contractors are doing a real service to the construction industry, and before long the advantages of these methods will be recognized by every man doing construction work.

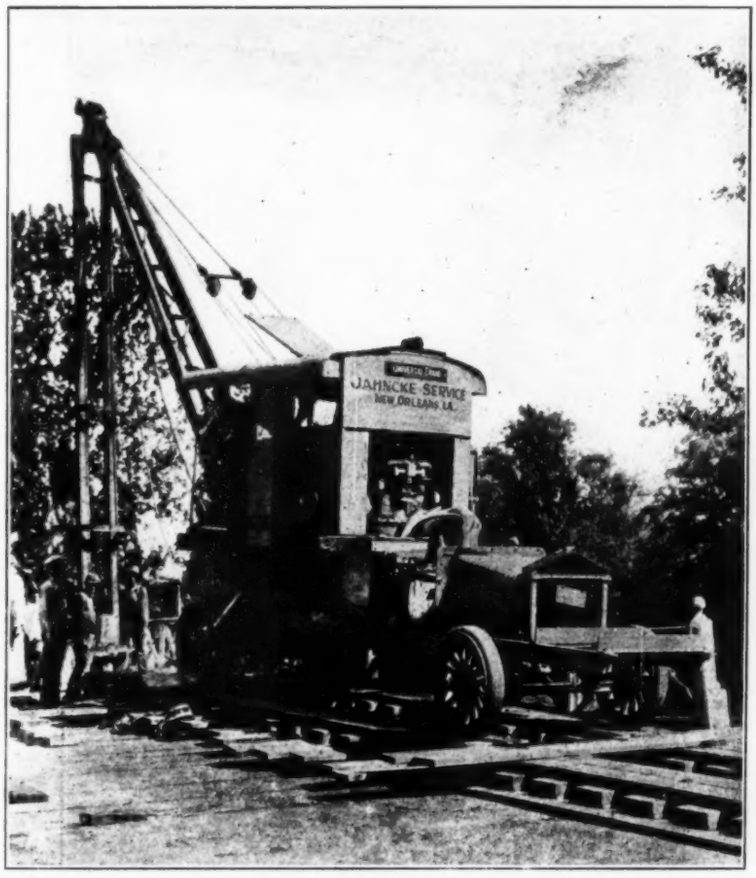
WET BURLAP IS SPREAD ON NEWLY FINISHED CONCRETE

CRANE TREADS LIGHTLY IN SOUTHERN SWAMP

Mounted on Motor Truck and Equipped with Special Mat to Work on It Digs Long Ditch

ANY versatile piece of equipment is valuable to a contractor and the portable crane shown in the accompanying photograph deserves that description. In this picture the crane, which is mounted on a motor truck, is shown driving piles on a light bridge job near New Orleans, where it is operated by the Jahncke Service.

After the bridge was completed this crane was sent to a job 25 miles out of the city in a swampy, jungle-like country, where a ditch had to be dug through the swamps and a roadbed constructed out of the muck taken out. Although this particular piece of equipment is extremely light, it proved necessary to construct a special mat on which it operates.



CRANE DRIVES PILES ON FRAIL BRIDGE

The work began in August and will be finished some time in December. Thus far the crane has proved its ability, with the aid of its light mat, to penetrate places where the average piece of equipment of similar capacity could not make progress because of its weight. It is doing a good job in a place where several contractors refused to attempt the work.

The bridge job shown in the photograph also was a piece of work suited only to fairly light equipment. It was possible by laying the planks shown under the truck to maneuver the crane into a position on the bridge where it could drive the piles for the new structure. A crane mounted in this manner can be moved from one place to another with so little loss of time that it can do a small job like this much more economically than a heavier or slower moving machine could handle it.

MINNESOTA INDULGES IN WINTER ROAD CONSTRUCTION

MINNESOTA seems as though it would be the last State in the United States to engage in road work during the winter, but, nevertheless, C. M. Babcock, State highway commissioner, will open bids on Nov. 18 on ten projects with a total length of 130 miles. The work will consist of graveling and grading. The estimated cost of the graveling is $325,000 and of the grading $50,000. The Minnesota highway engineers claim that graveling surfaces can be done more cheaply during the winter than in the summer, as the roads are frozen and should make it possible to haul bigger loads. The ten jobs on which bids have been asked will be carried on and are in different parts of the State.

OUR COVER PICTURE

THE illustration on the cover of this issue of SUCCESSFUL METHODS shows the Taughannock Viaduct of the Lackawanna Railroad in the background and the famous Lackawanna trail in the foreground. Much of the Lackawanna trail is built on the old roadbed of the railroad. It was sold to the State of Pennsylvania for $1 and is one of the most picturesque highway in the eastern part of the United States, being a favorite tourist route.

This photograph was taken last June during the visit of the Pan-American Highway Commission to the United States. The members of the Commission were taken over the Lackawanna trail by the Pennsylvania State Highway Department on a rather wet day, and were more than enthusiastic about this particular highway.

A WELL ORGANIZED MATERIAL YARD

Bucket Loaders and Conveyors Handle Two Kinds of Business

FLEXIBLE equipment is necessary in a material yard which undertakes to supply batches of stone, sand and cement for paving work, and in addition to sell these materials separately to other contractors.

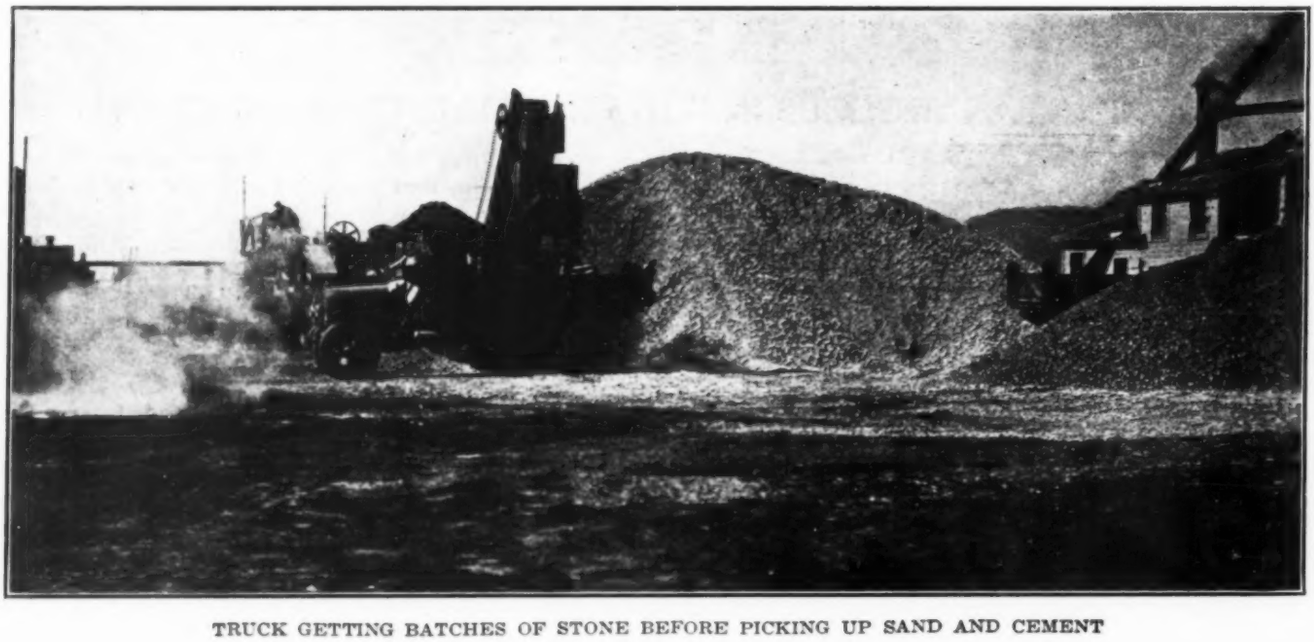
The Spoor-Lasher Company of Poughkeepsie, N. Y., has been handling business of this kind successfully during the construction season. The material yard is located on the bank of the Hudson River and the materials arrive in barges and are unloaded and piled along the dock with a floating digger.

In addition to its regular wholesale and retail trade with other contractors, the Spoor-Lasher Company has constructed about 60,000 sq. yd. of pavement in Poughkeepsie during the season just ending and has handled all of the material for the pavers in batch trucks each holding three batches. The concrete base of the paving was put through the mixer in two-bag batches, 1-3-5 mix. Average haul from material yard to mixer was about ¾ of a mile. Two bucket loaders and a conveyor were used to supply these trucks.

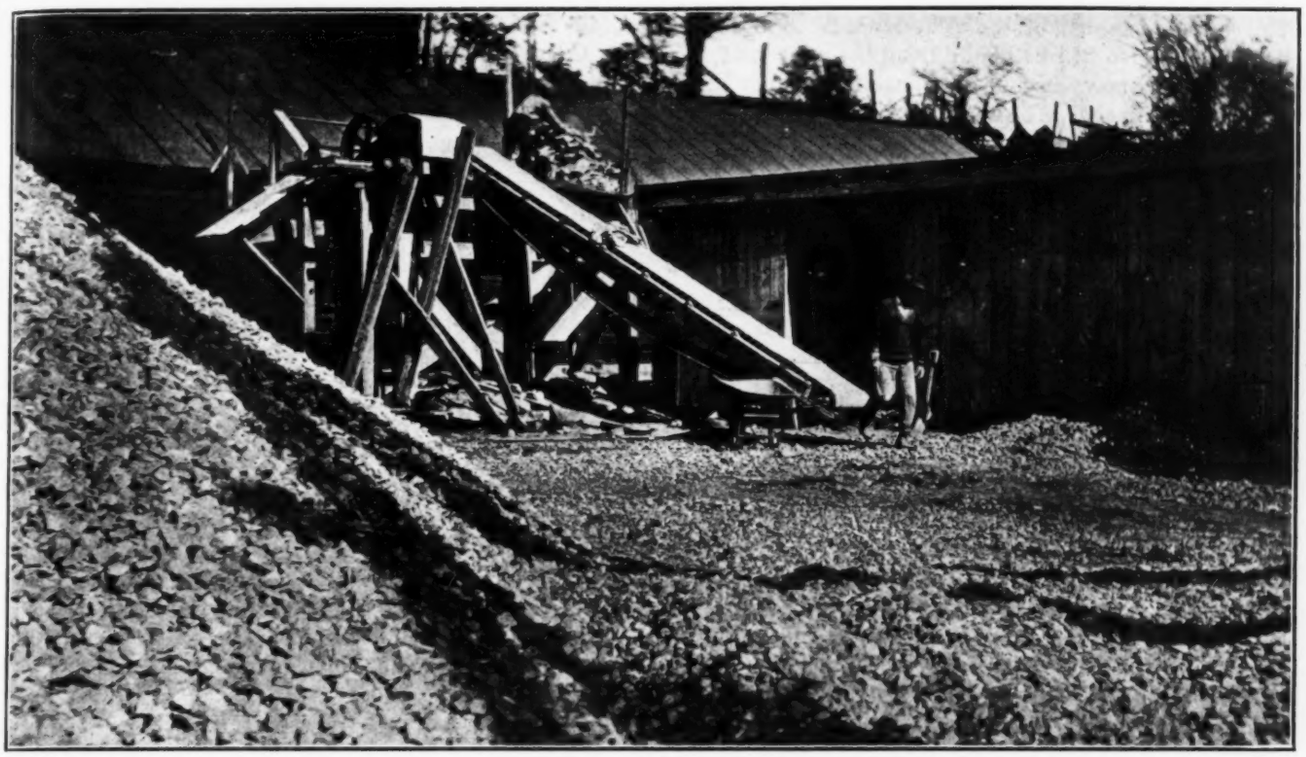
THE TWO LOADERS WITH CONVEYOR BETWEEN

Upon entering the yard an empty truck first pulled up to the stone pile and was loaded with three measured batches of stone. It then moved on to the cement shed, picking up three batches of cement, and from there to the sand pile, where three batches of sand were added.

The cement was loaded from a platform which, in turn, was supplied by a portable belt conveyor running from the door of the cement shed. One man handled the cement on this platform, emptying two bags into each of the three hoppers so spaced that all three could be dumped into the waiting truck underneath the platform at one spotting of the truck. Each of the bucket loaders was equipped with



TRUCK GETTING BATCHES OF STONE BEFORE PICKING UP SAND AND CEMENT



THIS CONVEYOR AT THE DOOR OF THE CEMENT SHED ELEVATED CEMENT TO LOADING PLATFORM BETWEEN SAND AND STONE PILES

a batch hopper controlled by the loader operator.

The average time that a truck spent in the yard, figured from the moment that it came in the gate empty until it went out loaded with three batches of stone, sand and cement, was about 4 minutes.

The efficiency of this method was proved by the fact that the Spoor-Lasher Company was enabled to average about 1000 sq. yd. of concrete base pavement per working day. With this set-up it also was possible to use the same loaders for taking care of orders from other contractors whose trucks could be fitted in between two of the company's trucks without delay.

AMERICAN ROAD BUILDERS PREPARE FOR RECORD CONVENTION AND SHOW

Great Array of Machinery Will Fill Chicago Coliseum and Adjoining Buildings

MORE space for the road show, a convention program which discusses every angle of road construction and maintenance, and a series of entertainments that will eliminate any possibility of idle time, have been provided by the American Road Builders' Association for its annual gathering at Chicago Jan. 5 to 9 next.

At present the list of applications for exhibition space in the Coliseum and adjoining buildings includes more than 200 manufacturers of road building equipment. This is a greater number than had applied at this time last year or in previous years, and by the time the allotment of space is made on Nov. 10 it is expected that the previous record for the total number of exhibitors will have been passed. The increased space, in addition to making it possible to accommodate a greater number of exhibitors, will offer an opportunity for larger and more attractive exhibitions than have been possible in the last few years.

The convention program has been prepared by Prof. T. R. Agg, who has long been identified with road building in the United States. Some of those who are expected to speak are: A. H. Hinkle, Maintenance Engineer, Indianapolis Highway Department; W. H. Connell, Engineering Executive and Deputy Secretary of Highways for Pennsylvania; C. H. Conner, State Construction Engineer for North Carolina; Charles M. Upham, Director, Advisory Board on Highway Research; Arthur H. Blanchard, Professor of Highway Engineering and Highway Transport; Prevost Hubbard, Chemical Engineer, The Asphalt Association, and Harry D. Robbins, Division Engineer, New Jersey State Highway Department. Other names will be added to this list within the next few weeks.

The entertainment of the delegates and other visitors is again in charge of A. C. Cronkrite, who has arranged a stag party on Tuesday, Jan. 6, and an informal supper and dance at the Club Chez Pierre on Thursday, Jan. 8.

The annual banquet of the American Road Builders' Association also will be held during the convention.

The Road Show, as has previously been announced, will again be in charge of C. M. Upham, Business Director of the Association. He will open headquarters at the Congress Hotel a month or more before the convention starts. All applications in regard to space and other details should be addressed to him there.

NEW BRIDGE ON SCENE OF FAMOUS HOLD-UP

THE Iowa State Highway Commission has distinguished itself by building one of its best and handsomest bridges across the Rock Island road at Adair at exactly the point where Jesse James perpetrated one of his most daring hold-ups. The old grade crossing which the great bandit utilized when he flagged the train no longer exists.

The new bridge is a 3-span arch affair built of concrete. It is 192 ft. long with a 24-ft. clear roadway and a 5-ft. sidewalk. It is of the ribbed open spandrel type of arch. The main span is 80 ft. in length and the approach spans are each 56 ft. The approach spans are somewhat unusual for Iowa, being unsymmetrical. The difference in the elevation of the two ends in the arch springline is 17 ft. The reason for this type of approach span is that the viaduct is located over a deep cut and this type of span fits the topography. The monumental columns on either end and the treatment of the hard rails leading to the approach spans have been made to harmonize with the landscaping in connection with the city park at the southwest end of the bridge.

The viaduct was built by the Federal Bridge Company of Des Moines at a contract price of $46,000. It replaces an old steel structure built in 1908 by a St. Louis firm for which C. A. Lemkuhl, now county engineer and in charge of the construction of the present viaduct, was at that time job foreman.

The State Highway Commission may have to fight hard to keep from having the bridge called the Jesse James Bridge.

BLOWING UP AN OLD HOUSE

Dynamite Makes Quick Work of Stone Structure

AN old stone house dated back to the Revolutionary times which blocked the proposed roadway to a children's camp near Wilmington, Del., was destroyed recently by using dynamite. After various methods of removing the house had been discussed, it was decided to try explosives and about 25 lb. of dynamite were placed on the inside walls of the building, properly spaced. Each charge consisted of two sticks of dynamite and a detonator and was so arranged that when the explosion occurred the walls fell inward and did not scatter débris over the landscape.

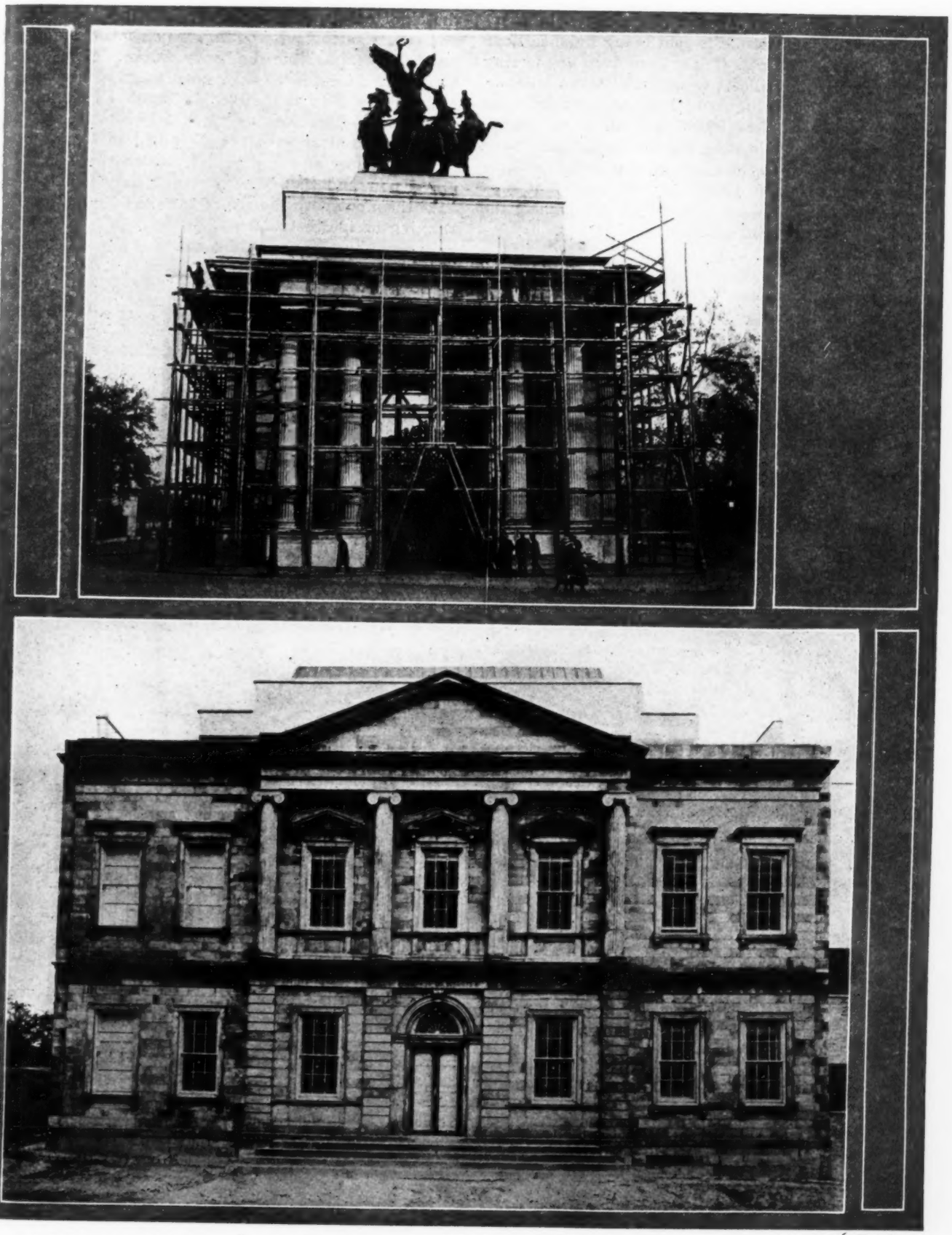
The charges were fired by a blasting machine operated from a safe distance and about thirty children who were living at the camp witnessed the operation. The entire work of wrecking the house was accomplished in about 2 hr.

WHEN THE OLD HOUSE DISAPPEARED

The accompanying photograph shows the actual explosion and it may be seen that the arrangement of the dynamite to make the walls fall inward worked to perfection.

The removal of obstructions of this sort is a part of nearly every construction job and where explosives are properly and carefully handled they can effect a large saving in both time and money. The average contractor knows that he has to use explosives when cutting through heavy rock, but he is inclined to forget that they may also be used with profit in removing obstructions of a different nature such as this stone house. This particular operation is a fine example of what can be accomplished.

Reconstruction



(*Keystone*

The triumphal arch at the west end of Constitution Hill, London, which is in the hands of the builders for repairs. The old assay office stood on Wall Street for a century and now has been rebuilt as a wing of the Metropolitan Museum in Central Park. © *International.*

ROAD BUILDING IN WET TERRITORY

Industrial Haulage Solves Contractors' Problem on Highway Near Buffalo

A ROAD job that has been put through in a remarkably short time is just being finished near Buffalo, N. Y. The new Colvin Boulevard connecting Kenmore with the Ellicott Creek Road is 3.4 miles in length, is built of four 10-ft. strips of reinforced concrete and comprises 85,000 sq. yd. of pavement.

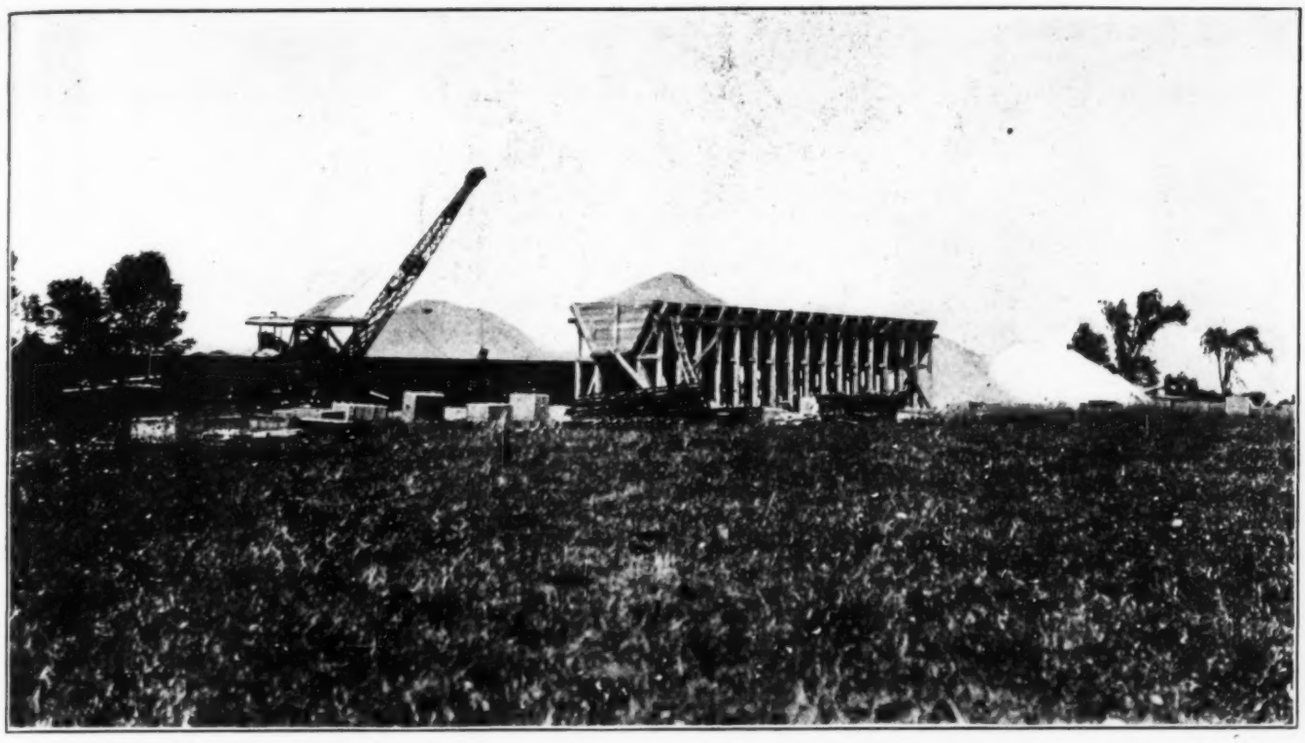
The survey for this road was not made until May of this year, so when the contract was let to the Harrison Engineering & Contracting Company it was realized that it would be no easy job to complete the work before the end of the construction season.

The land through which the new boulevard runs is of a rather swampy character, as is shown by the photograph at the bottom of this page. The new highway is crossed by a number of small streams and the clay surface has been permeated with water throughout the time when the road was being built.

After looking over the job, C. D. Ream, the engineer in charge of the work for the Harrison Engineering & Contracting Company, decided to adopt the industrial system of supplying the mixer. One of the chief reasons for the use of the industrial track and cars was the soft footing, which made the going practically impossible for heavy trucks. Most of the aggregates, therefore, have been conveyed from the material yard to the mixer in batch boxes hauled over narrow-gage track by gasoline locomotives. Some of the aggregates have been handled in light motor cars with special dump bodies. Even these became mired now and then, but it was a simple matter to haul them out with the aid of the gasoline locomotive running beside the road.

The sub-base of the road consists of 6 in. of crushed gravel and slag, and over this has been laid a 6-in. base of rough concrete. This concrete is a 1:2:4 mix reinforced with wire mesh. The surface is composed of 2 in. of fine concrete of 1:1½:2 mix, the aggregates used being fine sand and pea gravel. Because of the wet nature of the soil, concrete sewers and storm water drains varying in diameter between 24 and 48 in. run the whole length of the boulevard. The storm water is collected by catch basins spaced 300

THIS SORT OF GOING MADE ROAD BUILDING A REAL JOB

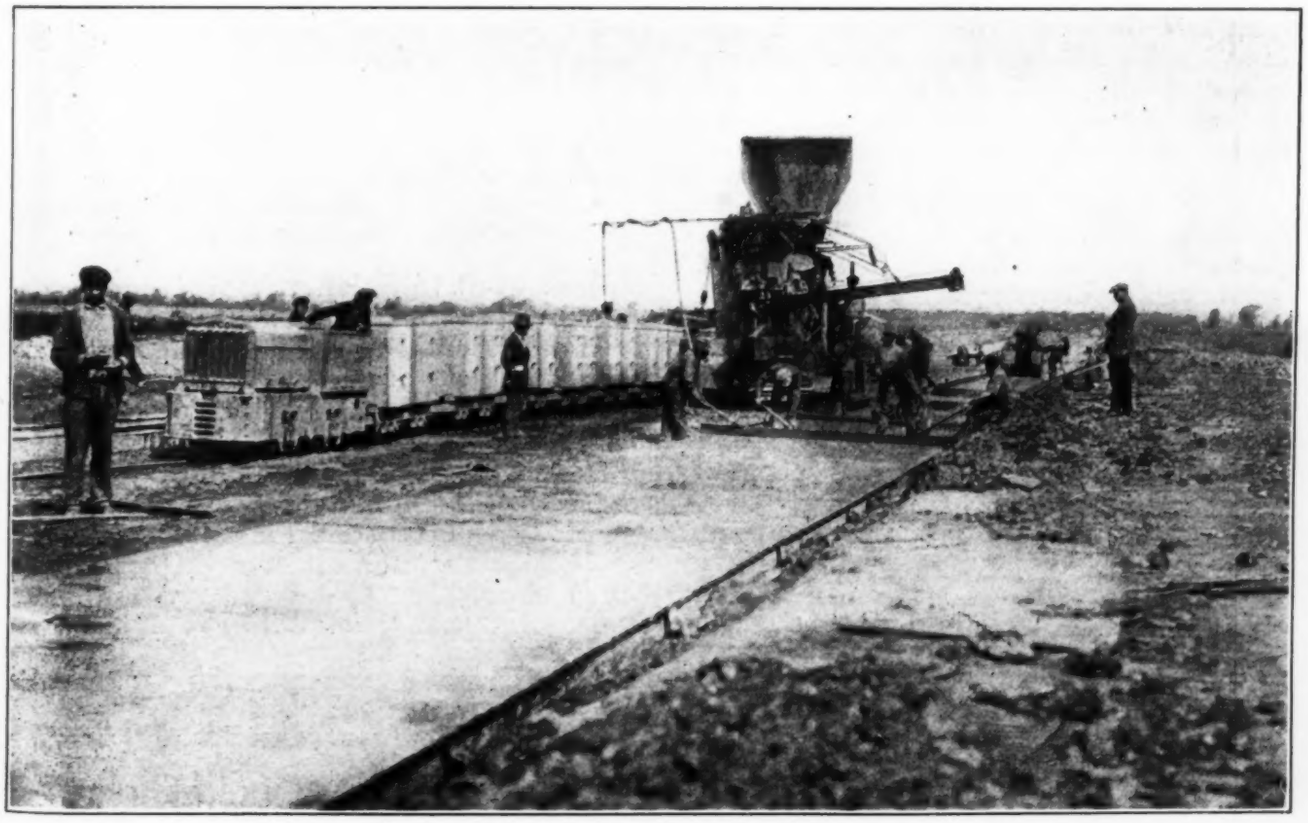


THE MATERIAL YARD HAD AMPLE BIN CAPACITY

ft. apart on both sides of the new concrete road.

The fact that this 40-ft. road has been built in such a short time shows that the industrial haulage system is unusually effective when the conditions for it are proper. Without it the construction of this piece of highway would have been next to impossible.

On a job such as this, industrial haulage made an almost ideal layout. The grades were not great at any point on the road and the gasoline locomotive handled fairly long strings of batch box cars without difficulty. The paver was kept busy all the time which, as every contractor knows, means rapid progress.



KEEPING THE PAVER BUSY

1—R. E. Sholes' Barber-Greene Ditcher cutting through hard going on a Raleigh, N. C., water main job. This photograph shows the discharge and the vertical digging boom.

2—Notice the clean cut ditch, and the dirt pile placed well back from the cut.

3—A close-up of the ditcher, showing discharge.

Would 800 feet every 8 hours finish your ditching contract?

The ability of the Barber-Greene Ditcher to walk through tough going, at a sustained high speed, makes it invaluable when the time left for finishing a contract grows short. And when wintry weather makes pick and shovel work excessively expensive, the Barber-Greene Ditcher will show remarkably low costs.

On a water main job in a Raleigh, North Carolina, subdivision, R. E. Sholes put his Barber-Greene Ditcher through 800 lineal feet of disintegrated granite that had become cemented due to the action of water upon it, in eight hours.

On another ditching job in Champaign, Illinois, a Barber-Greene Ditcher excavated 678 lineal feet of trench at a cost of but 3½ cents per lineal foot. Estimated hand labor costs for this particular job amounted to 30 cents per lineal foot. On this basis the Barber-Greene Ditcher saved over $170.00 on labor costs alone, in one day. Unusual mobility permits the Barber-Greene Ditcher to dig stubs and short runs at a cost that compares favorably with that for long straight-run work.

The Barber-Greene overload release sprocket eliminates all danger of rooting out hidden pipes, and saves wear and strains on the machine when underground obstructions are encountered.

If you want to finish a ditching contract before snow flies, if you are faced with the problem of cutting through frosted ground this winter, or if you are anxious to lower your digging costs for all seasons, our booklet "Modern Ditch Digging," should prove of value to you. It shows how Barber-Greene Ditchers have speeded up work and cut costs on a number of digging jobs throughout the country. Send for a copy.

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